The Biochemistry of Inorganic Polyphosphates

by I. S. Kulaev
Wiley; Chichester, 1979
vi + 256 pages. £17.75

'The Biochemistry of what?' was my immediate reaction to an invitation to review this book. Although my own knowledge of inorganic polyphosphates was vague and minimal, I was surprised to find that the information on these compounds available in general biochemical textbooks would have left the proverbial postage stamp in pristine mint state. Professor Kulaev, one of the leading workers on inorganic polyphosphates for the past generation, has provided in this book the first comprehensive monograph on a neglected subject. The publication of this English translation aims to bring these high-energy polymeric compounds to a wider audience of biochemists.

The first three chapters of the book deal with: chemical structure and properties; isolation, detection, occurrence and distribution of the inorganic polyphosphates. By careful sequential arrangement of these topics, Kulaev is able in chapter 4 to assess critically the reliability of the published data on the cell content and degree of polymerisation of these compounds in the light of the methodology used.

The forms in which high molecular weight inorganic polyphosphates exist in the cell – whether they are complexed with RNA and, if so, the nature of the bonding – comprises the next chapter. The detailed discussion (2 tables; 4 figures, approx. 60 references) is however inconclusive and is summed up by the author's own statement:

> 'The precise form in which the various polyphosphate fractions are present in the cell remains to be clarified in the future'.

This detailed weighing of conflicting experimental data followed by such inconclusive summaries was one of my overriding impressions of the book and of the subject. A similar statement is found in the following chapter regarding content of 'volutin granules' where polyphosphates are found.

The remaining two-thirds of the book is concerned with the metabolism of inorganic polyphosphates. The thirty-page chapter on biosynthesis again leaves one with few 'hard' facts. Thus on p. 92 we find:

> 'In concluding this discussion of the literature information on the mechanism of the biosynthesis of high-molecular-weight polyphosphates in various organisms, and consideration of the various aspects of this problem, it is pointed out that a complete solution remains remote.

Other summary statements are not only verbose and non-committal but present pseudo-conclusions such as (p. 90):

> 'Whether the in vivo biosynthesis of polyphosphates involves known or unknown enzymes, the process perhaps occurs at certain subcellular structures, primarily at various cell membranes'.

Chapter on the pathways of utilization and degradation of high-molecular-weight polyphosphates, control of their metabolism and their physiological function follow that on biosynthesis. The chapter on physiological function, together with the final chapter on inorganic polyphosphates in chemical and biological evolution are perhaps of greatest interest to the general reader.

The book concludes with a list of over 800 references, which are arranged alphabetically by first author's name and give full titles of the papers. These references, including approximately 120 by the author, have been updated since the work originally appeared in Russian in 1975.

The turgid style of the brief quotations given in this review is, unfortunately, typical of the book as a whole. I am still unable to fathom the meaning of some sentences. (What, for example, is meant by the final sentence of the book 'Alongside ATP, they continue to play an important part in the energetic and plastic (*sic*) metabolism of, it would appear, all contemporary organisms'?)

In conclusion, this book will be an invaluable reference source to those already working on inorganic polyphosphates or to these workers brave enough to embark on the difficult study of these still rather obscure compounds. However, it is unlikely to enthuse the general biochemist. If inorganic polyphosphates are the Cinderella of biological macromolecules, this book is not her fairy godmother.

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